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# Two Technical Problems Leave Neutrinos' Speed in Question

By **KENNETH CHANG**

Remember those faster-than-light neutrinos that supposedly defied Einstein's speed limit?

Never mind — or rather, maybe.

Last September, [CERN](#), the European Organization for Nuclear Research, based outside Geneva, announced a finding that, if true, would throw a large monkey wrench into physics as we know it. Ghostly subatomic particles known as neutrinos that were generated at CERN and beamed through the earth 453 miles to a detector in Italy appeared to be arriving at their destination about 60 billionths of a second faster than a particle of light would.

In a detailed scrutiny of the experiment, CERN, which runs a particle-smashing machine called the [Large Hadron Collider](#), found two problems with its equipment that could have affected its measurements.

One is an electronic component that marked the exact times for GPS measurements. (The experiment requires such precise measurements of time and distance that even continental drift is taken into account.) The component was “clearly out of its specifications,” said Dario Autiero, a physicist who is the spokesman for the experiment.

However, that error would have sped up the neutrinos even more.

The second potential error is in the fiber-optic cabling that carried the GPS data five miles to the underground detector. The investigation discovered that for dimmer light pulses, the circuit receiving the data introduced delay — up to 60 billionths of a second — that could bring the neutrinos' speed back under the speed of light. The circuit has now been fixed.

The journal Science reported the potential fraying of the experiment's conclusions — which many physicists had found hard to believe in the first place — on its Web site on Wednesday.

But Dr. Autiero said the issues it identified did not conclusively prove or disprove the findings. “We are not sure of the state of this connection in the past,” he said.

A new round of neutrino firings will begin in late March, and if the cable issue is at fault, the answer will be resolved shortly afterward.



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